FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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Nov. 12–27	Paris Aero Salon
Nov. 15–26	International Air Navigation Congress (Paris)
Nov. 17	Lecture, "Requirements and Difficulties of Air Transport," by Col. F. Searle, before R.Ae.S.
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1922.	
Jan. 5	Lecture, "Specialised Aircraft," by Wing-Com. W. D. Beatty, before R.Ae.S.
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Feb. 16	Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.

EDITORIAL COMMENT

LAST week Lord Montagu of Beaulieu put questions to the Government on the subject of aviation, both civil and military, which had the effect of drawing a lengthy and detailed statement from Lord Gorell, regarding present and future policy towards the cross-Channel and inter-Empire air services. Dealing first with airships, the Under-Secretary for Air said that the Government was limited as to funds, and urged the point that the real prosperity of an industry is bound up in private enterprise. He, to some extent, took the edge off by saying that the whole question of the employment of airships on the Imperial air routes is *sub judice* pending the decisions of the Dominion Governments regarding the extent, if any, to which they are prepared to support and subsidise an attempt to provide airship services between the home country and the outlying parts of the Empire. With this, in the meantime, we must perforce rest content, though we should have appreciated an indication of how far the Imperial Government is prepared to go in support of any scheme that may receive the backing of the overseas Dominions.

Aviation in the Lords

Lord Gorell was rather more definite in his pronouncement on the subject of the cross-Channel services. Confirming the Air Ministry announcement of June last, he said the Government was prepared to find £200,000 per annum for three years, by way of subsidies to the companies carrying on those services. It is little enough to devote to the fostering of an industry upon which we so heavily depended during the War, and upon which we shall lean more heavily still in the event of the Empire once more becoming involved in a great war. Still, it is an earnest that the Government does in fact regard civil aviation as a factor to be reckoned with and to be encouraged against future eventualities, which is something to the good.

* * *

Professions and Actualities

Lord Gorell in effect told the House that the Government agreed to the principle that it is essential to maintain and encourage commercial air services. He agreed that it was absurd to think that the military and civil sides of aviation are in any sense antagonistic,

although the primary responsibility of the Air Ministry is the defence of the Realm. He also indicated that it was the view of the Government that we must measure our air policy by that of the most progressive, rather than the most backward of the nations which aspire to aerial power. Now, all this would be comforting indeed if practice accorded with professions. As a statement of faith, Lord Gorell's speech left nothing to be desired, but when we come to compare the official protestations with the official acts, we are left wondering whether conviction is really as deep as the Under-Secretary would have us believe. It is perfectly clear that the Government ideals as outlined to the House of Lords by Lord Gorell are not in agreement with the scope of the means adopted to give effect to them. In a word, the professions do not accord with the actualities of the case.

To use his lordship's own words, it is specially beholden to us to develop in every way the power of the air, and to see that we maintain our lead. For the purpose of warfare we are becoming less and less of an island, and if there is no outbreak of war for a very long time, it is certain that, when the outbreak occurs, the greatest part and the earliest part of it will be in the air. These are potent words, falling, as they did, from the Air Ministry's own representative in the Upper House. We should value them much more if, as we have said, the acts of the Government marched more closely with the protestations. But, unfortunately, they do not, and no one can have a clearer knowledge of this than the Government itself.

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Ourselves and Others

It is all very well for the Government to tell the country that it acknowledges the necessity of keeping pace with the most progressive of our possible rivals, but unless this admission is accompanied by a policy—a live policy—directed to that end, such statements only amount to so much "eye-wash," and can convince no-one who has knowledge of the facts and the power to think. Let us see how far we are travelling along the road to the maintenance of the "lead" to which Lord Gorell refers. We have already seen that Government assistance to British civil aviation is, during the next three years, to be limited to subsidy payments amounting to a gross total of £200,000. He hopes that by the beginning of March next there will be three services running between London and Paris and one between London and Brussels. Now, what is France doing? We are sorry that once more we have to return to the subject of French progress, but in the circumstances there is simply no help for it. In round figures, France proposes to allot 157,000,000 francs to the encouragement of civil aviation during the financial year 1921–2. We note that General Brancker, in a letter to *The Times*, takes the Budget exchange value as 35 francs to the £ sterling, which gives roughly 4½ millions to be spent by France on the development of her civil air policy. But suppose we take a figure which seems to be fairer and assume the present rate of exchange of about 50, even then we get a total of over three millions, against which our own allocation of £200,000 seems meagre to a degree—even beggarly. Of this comparatively huge sum, over a million sterling—or, quoting General Brancker's exchange assumption, over a million and a quarter—is to be paid in direct subsidies to the various French lines operating in Europe and Africa, while two millions are to be expended in "indirect" assistance in the way of aerodromes, sheds, lighthouses, wireless organisation and meteorological services.

France has air lines in operation representing, roughly, 6,100 miles flown over regularly, against the existing 420 miles of British routes actually being operated. Where does the "lead" of which Lord Gorell speaks come in? And, in face of these unpleasantly convincing facts, is it possible—bearing in mind the official admission that the next war will descend upon us from the air—for the Government to maintain that it is carrying out its plain duty to the country and preparing in the only possible way for eventualities? The answer is all too clear—too clear to need stating.

It is all very well for Government speakers to point to the fact that in Egypt and Mesopotamia Service aeroplanes are being used to assist in mail-carrying. That gets us nowhere in particular. It is not the business of Service machines to assist in the purely commercial enterprise of mail conveyance. Their job is to prepare for war, and every hour that is spent otherwise is wasted in so far as concerns the primary purpose for which a military Air Service exists. Besides, even if Service machines are so employed, how far do they assist us in overtaking the enormous lead that France has already obtained in civil aviation? Not at all so far as we are able to see, and it would seem to the plain person that the argument is only introduced as a red herring drawn across the trail. Taking everything into consideration, we are not at all convinced by Lord Gorell's long and by no means uninteresting explanation of the Government attitude. Like the curate's egg, it is quite good in parts, but the whole as a whole is quite uneatable.

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No. 6 Wing, R.N.A.S. Annual Dinner

THE third of the annual dinners of No. 6 Wing, R.N.A.S., Otranto, Italy, will be held at the Connaught Rooms, on Saturday, December 10, at 7.30 p.m. Any officers who were members of the Wing, and who have not received invitations themselves, or who know of others who have not, are requested to write to the Secretary, A. Lloyd-Taylor, Compton, Highfield Road, Purley, Surrey.

Neutralisation of the Aaland Islands

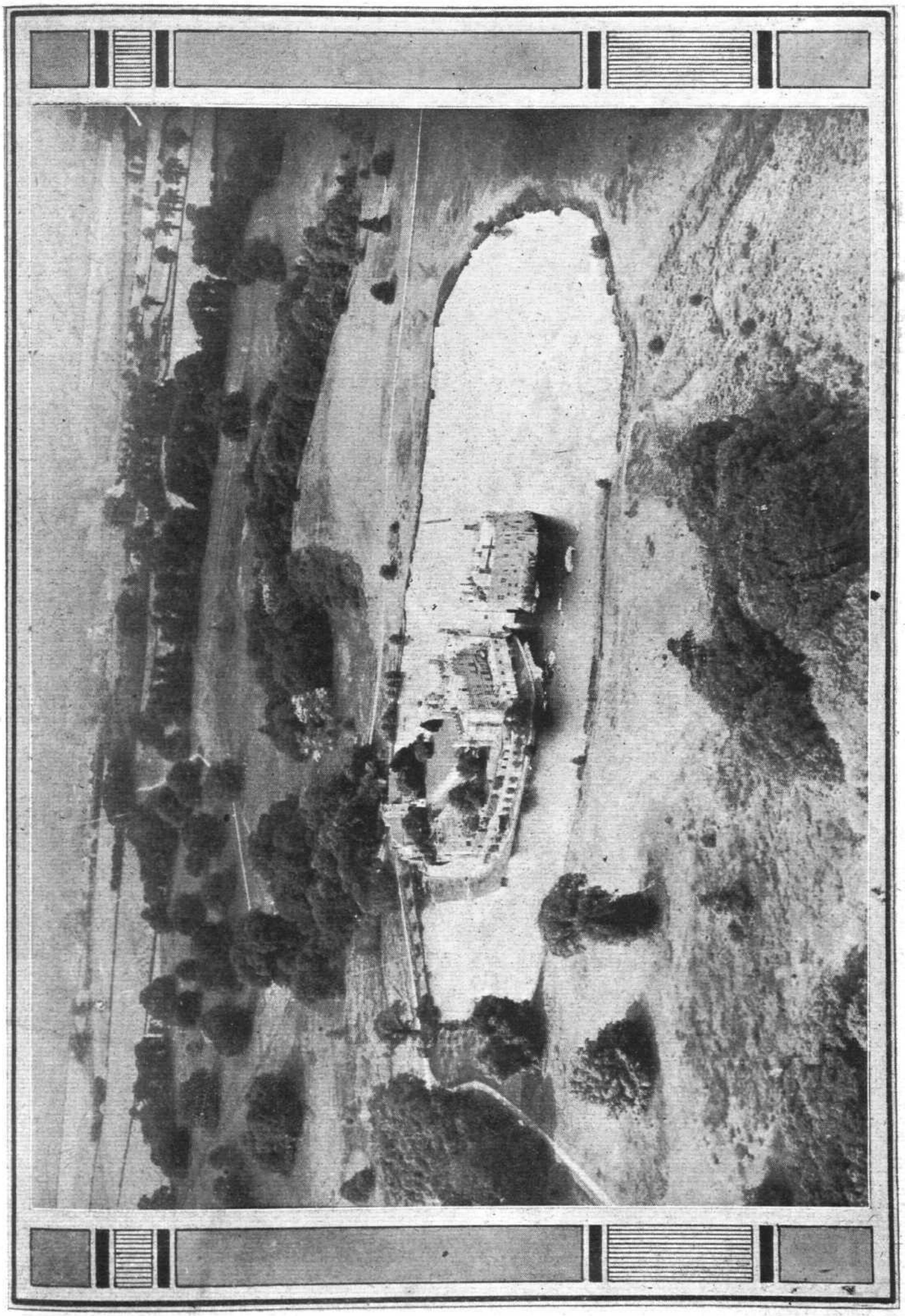
IN the text of the Aaland Islands Convention, drawn up, in accordance with the recommendations of the League of Nations, to guarantee the non-fortification and the neutralisation of these islands, which was signed at Geneva on October 20 by representatives of Great Britain, France, Italy, Germany, Denmark, Sweden, Finland, Esthonia, Lithuania and Poland, certain passages relating to aircraft and air forces are of interest. No air base, nor any other establishment used for war purposes may be maintained or set up in the area defined as "the portion of the Finnish archipelago known as the Aaland Islands." With certain exceptions no air force of any Power may enter or remain in the area, and the manufacture, import, transit and re-export of arms and war material are formally prohibited. Finnish Military or Naval aircraft may fly over the islands, but must not land except in the case of *force majeure*.

Some Records Homologated

THE following records recently established have now been homologated: Greatest speed over one kilometre, Sadi Lecointe on Nieuport-Delage "Sesquiplan," September 26, at Villesauvage. Speed 330.275 kilometres (206 miles) per hour.

Speed over a given distance of 100 kilometres, Brack-Papa on Fiat, October 1, at Villesauvage. Time, 22 minutes 5⅘ seconds, equal to a speed of 170 m.p.h.

Speed over a given distance of 200 kilometres: Georges Kirsch on Nieuport-Delage at Villesauvage on October 1. Time 42 minutes 39⅘ seconds, equal to a speed of 175 m.p.h.



LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE :
No. 13.—Leeds Castle, Maidstone.

HONOURS

IT was announced in the *London Gazette* on October 28 that H.M. the King has approved of the undermentioned rewards for distinguished services in the field in Mesopotamia :—

Second Bar to the Distinguished Flying Cross

Flying Officer John William Boldero Grigson, D.S.O., D.F.C., R.A.F. For gallant conduct and devotion to duty. This officer has always set a fine example to his flight by his courage and devotion to duty and by constant keenness and hard work. (D.F.C. gazetted September 21, 1918.) 1st Bar to D.F.C. gazetted December 22, 1919.)

Bar to the Distinguished Flying Cross

Flight-Lieutenant Reginald Stuart Maxwell, M.C., D.F.C., R.A.F. For gallantry and devotion to duty. This officer has recently carried out 14 raids over hostile country and 60 hours' flying. He has at all times shown constant courage and a very high sense of devotion to duty. On one occasion when forced to descend in hostile territory owing to engine failure, he displayed great coolness in endeavouring to remedy it under fire, and only when this was found to be impossible did he take advantage of the landing of another machine, and by lying flat out on its lower plane was carried away to safety. He has always set a fine example to the rest of his flight by keenness and hard work in the air and on the ground. (D.F.C. gazetted February 8, 1919.)

Flying Officer Hugh William Lumsden Saunders, M.C., D.F.C., M.M., R.A.F. For gallantry and unflinching example on all occasions, especially during the operations around Samawah, where he descended to very low altitudes to drop food and supplies on the garrison at Samawah and the gun-boat *Greenfly*. This officer's machine has been put out of action by hostile fire on several occasions. (D.F.C. gazetted November 2, 1918.)

Distinguished Flying Cross

Flying Officer Robert Narcissus Essell, R.A.F. (since killed). For great gallantry and devotion to duty. This officer has flown over 125 hours, and carried out 50 bomb raids. He is a very keen and daring pilot, who on two occasions has been shot down by hostile action.

Flying Officer David D'Arcy Alexander Greig, R.A.F. For gallantry and devotion to duty. All through the period of hostilities this officer has proved himself to be a very keen and daring pilot, and has on every possible occasion engaged the enemy from very low altitudes with excellent results.

Flying Officer Harry George Watts Lock, R.A.F. For untiring energy, gallantry and devotion to duty. He has operated in all areas during the insurrection. He has flown 130 hours, and has had four machines put out of action by hostile fire during operations. He was shot down and captured by the insurgents, and since his release never failed to carry on as usual.

Squadron-Leader Charles Henry Nicholas, A.F.C., R.A.F. For consistent good work, gallantry and devotion to duty. This officer has not only led his squadron in nearly every raid, but by his energy and devotion to duty has kept the squadron in a high state of efficiency. He was mainly responsible for bringing his squadron into action from Baghdad 14 days after landing at Basra, a remarkable achievement.

Flying Officer Harry Victor Norris le Vavasseur Noel, R.A.F. For gallantry and devotion to duty. This officer carried out 19 raids and 71 hours' flying during a period of ten weeks. He has displayed great keenness, coolness and devotion to duty at all times, notably on one occasion when he landed beside, and endeavoured to assist, a machine which was forced to descend in hostile territory.

Flying Officer Anthony Lauderdale Paxton, R.A.F. For great gallantry and devotion to duty, especially during operations around Samawah and Nasiriyeh. This officer's reconnaissance reports are exceptionally valuable, and he has proved himself a gallant and daring pilot.

Flight-Lieutenant George Clark Pirie, M.C., R.A.F. For great gallantry and good work, especially during operations in the relief of Diwaniyah and during our retirement to Hillah. This officer showed remarkable ability in quick initiative when leading his flight during operations.

Flight-Lieutenant Franks Lubbock Robinson, D.S.O., M.C., R.A.F. For continuous good work, gallantry and devotion to duty. This officer has flown over 100 hours during operations, and has shown at all times an untiring example throughout. He has had three machines put out of action by hostile fire from the ground.

Flying Officer Harry Noel Cornforth Robinson, M.C., R.A.F. For gallantry and devotion to duty. A gallant and daring pilot, especially while operating round Samawah and Nasiriyeh. His keenness at all times has been marked.

Flight-Lieutenant Harry George Smart, R.A.F. For energy, gallantry and leadership. This officer has shown a very fine example to his fellow officers, especially during low bombing raids, when he has frequently descended among heavy rifle fire to very low altitude to ensure accurate bombing of small targets. He has taken part in 25 day bombing raids and two night raids.

Flying Officer Ralph Squire Sorley, D.S.C., R.A.F. For great gallantry and devotion to duty. He has proved himself a very capable officer and fine leader. He has flown over 104 hours, and carried out 52 bomb raids by day and two by night. He has commanded a flight of No. 6 squadron for over six months with great ability.

Flight-Lieutenant Henry Karslake Thorold, D.S.C., A.F.C., R.A.F. For gallantry and leadership on all occasions when commanding the flight at Nasiriyeh. His work in the field has been an example to all ranks.

Distinguished Flying Medal

334664 L.A.C. Robert Bywater, 263760 A.C.2. John Percy Robert Clifford, 156188 A.C.1 James Moir McKean, 1349 A./Sgt. Sydney Charles Murton, 157612 A.C.1 Llewellyn Nicholas, 331198 A.C.1 Ernest George Penniall.

Meritorious Service Medal

313 S.M.1 William Charles Attrill, 313619 Flt. Sgt. Frank Bebington, 336426 Cpl. Sydney James Briggs, 864 Flt. Sgt. Charles Frederick Roland Bunting, 333099 L.A.C. (A./Cpl.) George Frederick Cooling, 313065 Flt. Sgt. Gilbert Clarence Croft, 334604 Flt. Sgt. Albert Edwin Dobson, 340517 L.A.C. (A./Sgt.) Frank Henry Hart, 780 Sgt. George Wallace Hepple, 334430 L.A.C. (A./Cpl.) Hugh Cecil Hitchcock, 1215 Flt. Sgt. John William Honeybone, 3929 Flt. Sgt. Charles Oakley, 84957 A.C.1 Herbert Petch, 145 S.M.1 Charles Ramplin, 201727 Sgt. Sidney William Sparkes, 2389 Flt. Sgt. John Henry Tuckey, 4201 Flt. Sgt. Barnabus William Wilson.

Mentioned in Despatches

The undermentioned officers and airmen of the Royal Air Force have been mentioned for distinguished service in a despatch received from Lieutenant-General Sir J. A. L. Haldane, K.C.B., D.S.O., General Officer Commanding-in-Chief, Mesopotamian Expeditionary Force :—

Allen, Flying Officer Laurence Wilfred, M.C.; Battle, Flying Officer Henry Frederick Vulliamy; Binnie, Flying Officer James Alexander Weatherhead; Bladon, Flying Officer Graham Clark; Burnett, Wing-Commander Charles Stuart, C.B.E., D.S.O.; Carter, Observer Officer Rodney Thomas; Coward, Flying Officer Graham Nelson; Croft, Flying Officer George; Desoer, Flying Officer Noel Lloyd; Drake, Observer Officer Bruce Gerdyne; Fitzherbert, Flight-Lieut. Evelyn Cecil Walter, D.S.C.; Huskisson, Sqdn.-Ldr. Bertrand Lawrence, D.S.C.; Hustwaite, Flying Officer John Walter: Jenkins, Flying Officer Robert Charles, M.C.; Jobson, Flight-Lieut. (A./Sqdn.-Ldr.) Frederick Cuthbert; McGregor, Flying Officer Andrew, D.F.C.; Nutting, Sqdn.-Ldr. Charles William, D.S.C.; Petch, Flying Officer Frederick, M.B.E.; Porter, Flying Officer Cedric Ernest Victor; Rees, Sqdn.-Ldr. Bictor Osborne; Sowrey, Sqdn.-Ldr. William, A.F.C.; Spackman, Flying Officer Charles Basil Slater, D.F.C.; Teagle, Flying Officer Cyril Hollis; Thomas, Flight-Lieut. Meredith; Vickers, Observer Officer John Harold; Baber, 62027, A./Cpl. William Charles; Banks, 244308, A.C.1 Thomas George; Beech, 156576, A.C.1 Frank John; Beer, 555, Flt.-Sgt. Archibald Augustus John; Berry, 603, Cpl. (A./Sgt.) Arthur George; Birch, 47558, Flt.-Sgt. Joseph; Burdis, 82480, A.C.1 Robert; Canler, 63672, Cpl. Bernard Ambrose; Cox, 56305, L.A.C. (A./Sgt.) Reginald Frank; Crisp, 210903, L.A.C. Edgar Bernard; Cutting, 287075, A.C.1 Horace; Davis, 193096, A.C.2 Alfred John; Davis, 340378, L.A.C. Francis Albert Victor; Davis, 407592, L.A.C. Thomas Albert Stanley; Dunn, 338881, Cpl. Thomas Ernest; Eager, 156802, A.C.1 Harold Sidney; Easterbrooke, 314181, Flt.-Sgt. Albert Edward; Eustace, 334596, Cpl. (A./Sgt.) Sidney; Fells, 268009, L.A.C. Richard George; Goodman, 241375, A.C.1 Albert John; Hardy, 340099, A.C.1 Alfred Wallace; Harwood, 294050, L.A.C. (A./Cpl.) Arthur Henry; Holloway, 249693, A.C.2 James; Hughes, 89300, A.C.2 Peter Anthony; Kidd, 167993, L.A.C. William; Lawton, 248897, L.A.C. Frederick Robert; Love, 298709, L.A.C. Cecil Ernest Hill; Lowrey, 334286, A./Sgt. Frank; Simmons, 248299, A.C.2 Reginald Edward; Thornicroft, 26244, Sgt.-Major Harold Maurice; Viggers, 168077, L.A.C. Thomas Prudham; Wallace, 329706, A.C.1 James Stewart; Ward, 73, S.M.1 Alfred; White, 159127, A.C.1 Albert Edward; Wright, 340156, A.C.1 John.

FLIGHT

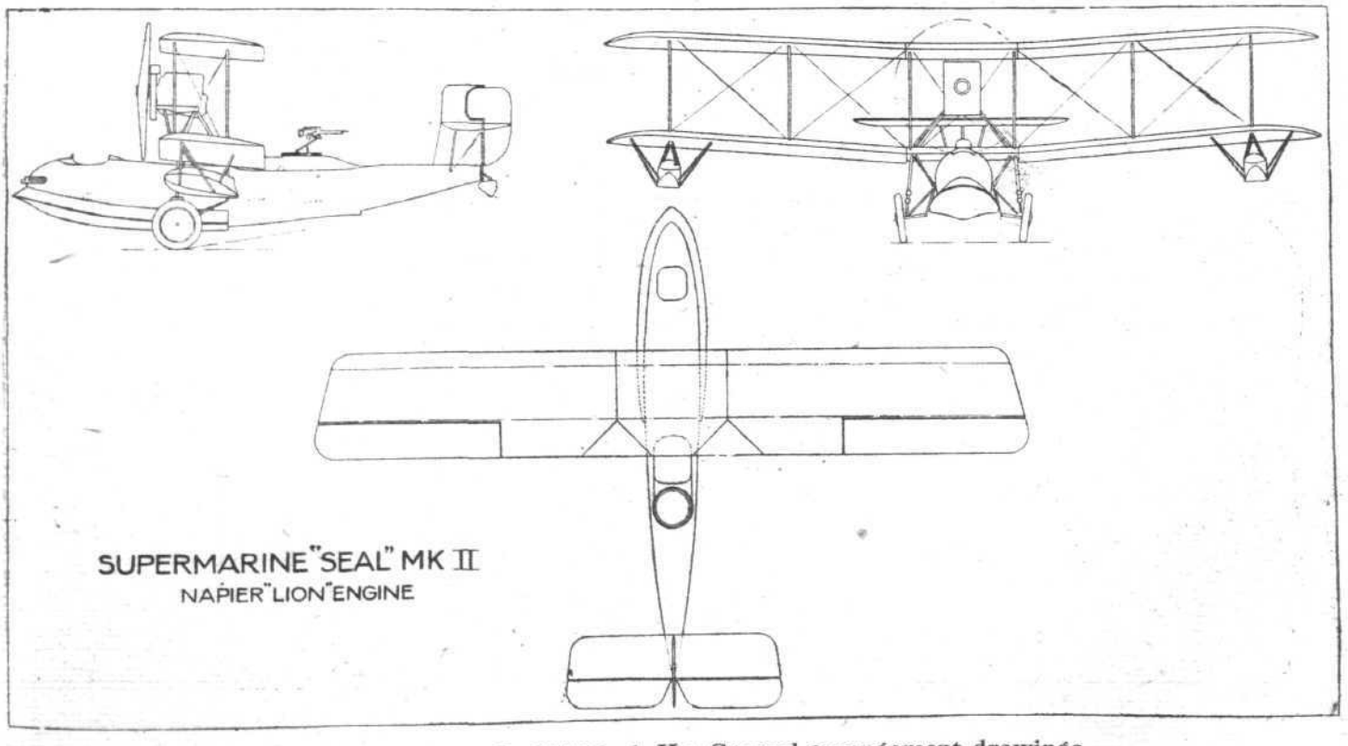
THE SUPERMARINE "SEAL," MARK II

An Interesting Deck-Landing Amphibian Fleet-Spotter

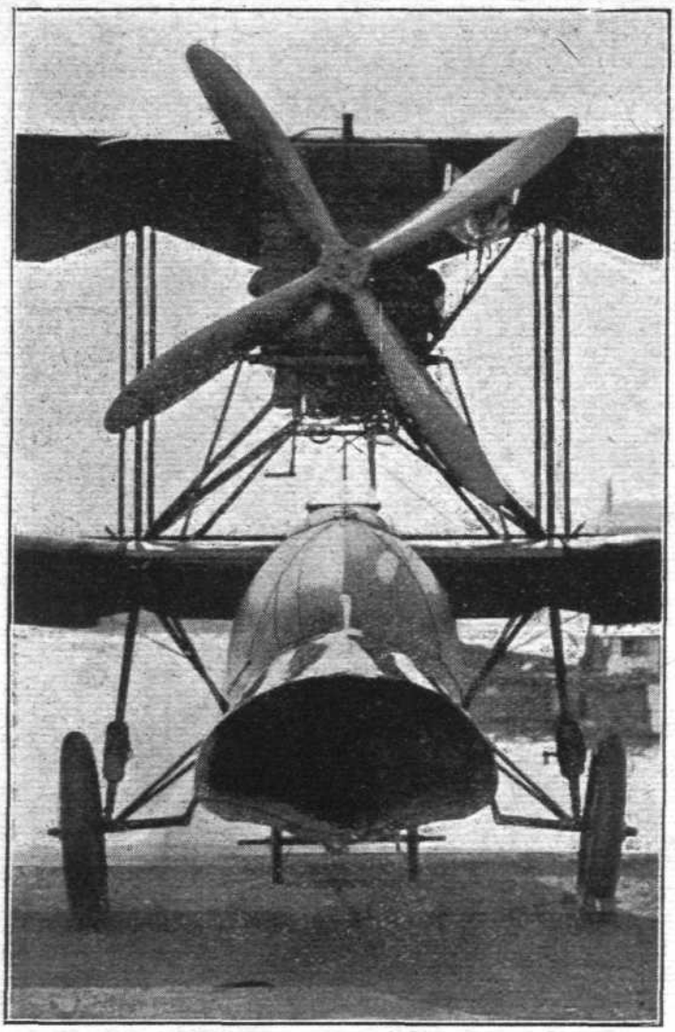
NOT only on account of its higher engine power, but also due to detail improvements of various kinds, the new Supermarine amphibian fleet-spotter "Seal," Mark II, is a very great step forward as compared with the machine of last year, which did so well in the Martlesham and Felixstowe tests. The older machine had a fairly high power loading, and as a result of this its performance was not spectacular, although it was certainly by no means bad for the weight and power. The new machine, with its Napier "Lion" engine, naturally has a much greater reserve of power, with the result that the get-off and climb are much improved. The fitting of a higher-powered engine is not, however, the only alteration which is responsible for the general improvement. The Martlesham machine, it should be remembered, was designed and built in a few weeks, and as no risk could be run of anything failing it was, generally speaking, a good deal heavier than was really necessary. In the "Seal," especially the Mark II, which forms the subject of this description, there has been more time for refinements, and, consequently, it comes much nearer a reasonable and uniform factor of safety than did the older machine. In the amphibian gear itself so many improvements have been effected that it cannot, in fact, be compared at all with that of the Martlesham machine. Unfortunately, as the "Seal" is built for the Air Ministry, it is not permissible to give a technical description of the amphibian gear, beyond mentioning the fact that it is a great improvement on the older one, and has proved very satisfactory during tests.

The Supermarine "Seal": Three-quarter front view of the machine on land.

In attempting to form an opinion of any Supermarine flying boat, it should always be borne in mind that this firm has always aimed at seaworthiness. This quality is regarded by Mr. Hubert Scott-Paine and Commander James Bird as of the very first importance. The result has been that Supermarines are always of substantial construction, a proper boat-built job, a boat that will fly rather than an



The Supermarine "Seal," Mark II: General arrangement drawings.



The Supermarine "Seal": Front view of the hull and centre-section, showing amphibian gear.

aeroplane that will float. There is all the difference in the world between these two types, and if at times one may be apt to compare, perhaps unconsciously, the performance with that of a lighter machine, it should be realised that such comparison is scarcely fair to the builders of the boat, who have had quite different objects in view. Broadly speaking, there are two different ways of evolving a flying boat, and even then the final result will be two different types, according to the evolution followed. One is to start with a hull which one knows to be seaworthy, and then to put on to that hull wings and engines to give the best performance possible. The second method is to start with an aeroplane having the lightest possible flotation gear, and then, as necessity arises, strengthen the structure and improve the seaworthiness of the flotation gear according to requirements.

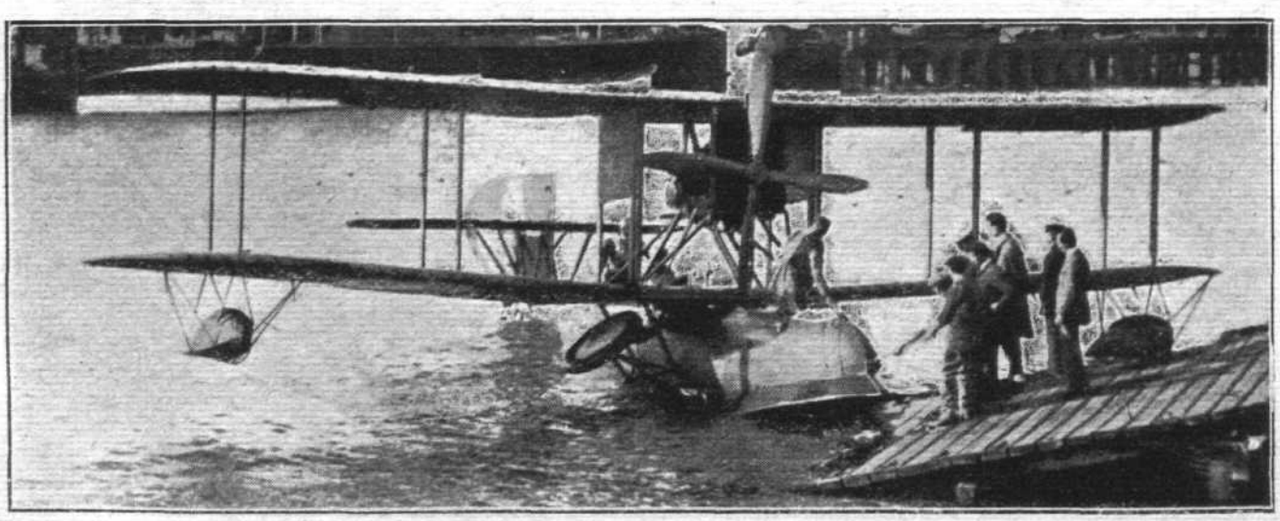
It will easily be seen that the final results of the two methods will still present fundamental differences, so much so that the two types, instead of being rivals, supplement one another, the one type being the more suitable where seaworthiness and robustness of construction are the main desiderata, the other where performance is the most important feature.

As already mentioned, in the Supermarine boats it has always been strength and seaworthiness which have been first considerations. That is not to say that their performance is inferior. For instance, although few figures relating to the "Seal," Mark II, may be published, it is permissible to state that the maximum speed is in the neighbourhood of 93 knots, while the landing speed is as low as 39 knots, a very good speed range indeed for a flying boat.

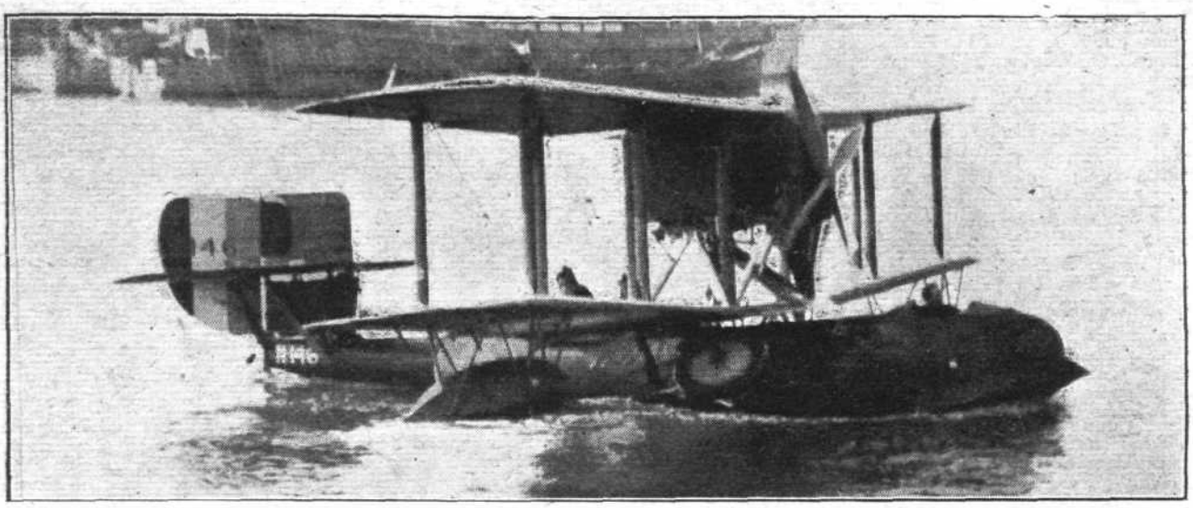
From the accompanying general arrangement drawings (which, although somewhat sketchy, are approximately to scale) and photographs it will be seen that, as regards general outlines, the main innovation in the "Seal" is that the machine is a tractor. This change was somewhat of an experiment, as it changes the weight distribution very materially. However, the experiment has proved a success, with the result that the Supermarine Works can now provide boats of either type, according to whether the main load is required to be in the front or aft of the main planes, knowing that either type behaves satisfactorily on the sea and in the air. Incidentally this machine is, we believe, the first British flying boat to be designed as a tractor. As regards appearance the change is, we think, an improvement. The pusher always looks somewhat short and tubby, while the new tractor machine conforms more to usual designs and, therefore, looks more pleasing to the eye.

Structurally, the "Seal" follows usual Supermarine practice, having a hull of approximately circular section, boat-built of planking over a light skeleton of timbers and stringers, and covered with fabric on the outside. As in previous Supermarine boats, the steps are separate units, built on to the main hull. They form a double bottom, and are subdivided into numerous watertight compartments, so that in case of the hull striking some object floating in the sea there is no fear of sinking. Also, in case of damage, a step can be repaired or renewed without interfering with the main hull. In the Martlesham machine, it may be remembered, the combined tail skid and water rudder was mounted some distance forward of the stern. In the "Seal" it has been shifted aft to the sternpost, where it is much easier to provide the necessary strength and water tightness than it is with a rudder working in a trunk in the hull. Also the tail loads, which are very considerable, are lessened by placing the skid aft. An easily detachable shoe is fitted to the heel of the rudder, so that, as wear takes place, the shoe can be easily renewed.

For reasons already mentioned, it is not permissible to refer in detail to the amphibian gear, beyond what can be gathered from the illustrations. It can be seen that the wheels and their strutting form a structure independent of that of the main hull. Thus, when alighting on the deck of



The Supermarine "Seal": The machine coming on to the slipway. The wheels have not yet been lowered.



The Supermarine " Seal " : View of the machine taxying. Note the wheel well clear of the water.

a seaplane carrier or on an aerodrome, the hull is not subjected to landing shocks. The track is wide, and the wheels, as may be seen from some of the photographs, lift sufficiently clear of the water not to hinder the getting off from the sea.

It should be observed that the upper and lower centre-sections form a complete unit, detachable from the hull, so that replacements can be made without interfering with the boat proper. The Napier " Lion " is very accessibly mounted on a system of struts resting on the lower plane centre-section, and the radiator is so mounted that it is not affected in the slightest by engine vibration.

The monoplane tail plane is of the semi-cantilever type, giving a good field of fire for the rear gunner. As in previous boats, it is of the negatively cambered type, and is carried high, well clear of the water, which is a great advantage in a rough sea.

The wing tip floats are of a type somewhat different from that previously used. Instead of the covered-in space between the lower plane and the wing tip floats, this space has been left open on the " Seal," it having been found better to leave the water free to get through the space thus formed.

As distinct from previous Supermarine flying boats, in which the wings have folded forward, the wings of the " Seal " fold back as in the majority of other machines. This has been necessitated by the new arrangement of the machine as a tractor, so as to enable it to be stowed in the smallest possible space. If the wings had been folded forward, they would have projected a considerable distance forward of the bows of the hull. Personally we prefer, for several reasons, the forward folding of the wings where practicable. Not only is the load on the tail skid greatly reduced thereby, but with wings folding forward the hinges are on the front spars. Thus, should one of the locking pins come adrift or break, the wings would still be held in their place by the horizontal component of the air resistance. However, this is probably mainly a theoretical objection, and we must admit that we have never heard of any trouble arising out of having the wings folding back.

As regards the accommodation, the " Seal " is designed to carry three people. The pilot, as distinct from the older model, occupies the front seat, whence he has an exceptionally fine view. A machine-gun mounting is provided in his cockpit, the gun being withdrawn when not in use, and the opening through which it projects being provided with a cover which prevents water getting into the cockpit when the machine is taking off the sea or alighting. The other two occupants are placed aft of the wings, the wireless operator's cockpit being about level with the trailing edge, and that of the aft gunner slightly farther aft. Owing to the mounting and strutting of the tail plane, the aft gunner has quite a good field of fire.

As already mentioned, few performance figures may be published, but it is permissible to state that the total military load carried, including fuel, is 1,790 lb., with a cruising radius of five hours. We understand that, in addition to the " Seals " being delivered to the Air Ministry, the Supermarine works have received an order from Japan.

London to Switzerland by Air

A NEW air service which completes the connection between London and the Swiss winter resorts was opened by a French firm recently. The new air line runs from Paris to Lausanne. At present it is necessary for passengers leaving Croydon by one of the air expresses to spend the afternoon and night in Paris, leaving for Lausanne next morning. It is, however, hoped so to arrange the service ultimately that the whole journey can be completed on the same day, with just a short stop at le Bourget.

Aeroplanes for Siam

IT appears that the Government of Siam is taking considerable interest in aviation. Recently, it is reported, aerodromes have been opened in various provinces, and machines are being or are to be imported from France and England to Bangkok. As the roads are not of the best, aeroplane services should have the effect of speeding-up considerably the inter-communication between the various provinces.

Middle East Command to be Divided

As from February 1, 1922, the Royal Air Force Command now known as the Middle East Command and comprising the Royal Air Force in Egypt, Palestine, Aden and Iraq, will be divided into separate commands, one consisting of the Royal Air Force in Egypt, Palestine and Aden, under the command of the Air Officer Commanding, Egypt, and the other consisting of the Royal Air Force in Iraq, under the command of the Air Officer and administered direct by the Air Ministry, instead of, as at present, by the Air Officer Commanding Middle East, which title from thenceforth will not be used.

America Tries Catapult Launching

THE question of launching aeroplanes from the deck of surface vessels is one that has received considerable attention in many countries. Numerous experiments have been tried with varying success. Platforms on the guns of battleships, long decks built on special seaplane carriers are among those best known. It now appears that America may decide to develop the catapult form of launching apparatus, in which a carrier runs along rails, impelled by a suitable power plant installed in the ship. Designs for such an apparatus have been in hand for some considerable time, and we now learn that the first experiment has been made with the actual apparatus, and has proved, so far as it goes, a success. It is too early to say whether or not this particular form of catapult will be suitable for all the types of craft required, but for comparatively light machines it is thought that the device will at any rate offer a good solution. The machine used in the experiment was a two-seater, piloted by Commander Richardson, and said to have dipped only about three feet after leaving the carriage of the catapult, and then to have commenced to climb. While the catapult may prove very successful for launching a machine, it does not, of course, help in any way the even more difficult problem of alighting on a ship.

NOTICES TO AIRMEN

Holland : Emergency Landing Grounds

PREVIOUS Notices to Airmen relating to Holland are amplified as follows :—

1. The under-mentioned aerodromes, etc., are available for use by civil aircraft *in emergency only* :—

(i) *Gilze-Rijen.* Military Landing Ground.—*Position.* Latitude 51° 34′ N., Longitude 4° 56′ E. Situated midway between the towns of Breda and Tilburg and between the villages of Gilze and Rijen, one mile south of Laagstraat railway station and on the west side of the Gilze-Rijen road.

Description.—Good surface of heath land, the surrounding country being well wooded and unsuitable for forced landings. The aerodrome lies 65 ft. above sea level. Dimensions for landing, 765 by 765 yards.

Obstructions.—*East*—Hangars, road and trees ; *south and south-east*—pine woods ; *west side*—road and trees.

Markings.—A cross of sand is marked out on the landing ground. A flag is flown from a hangar on the east side to show the direction of the wind.

Accommodation, etc.—Hangars, petrol, oil and facilities for running repairs are available.

(ii) *Souburg* (*Flushing*). Naval Aerodrome.—*Position.*—Latitude 51° 27′ N., Longitude 3° 35′ E. Situated ½ mile north of Flushing on the island of Walcheren, on the west side of the Walcheren canal and railway.

Description.—The aerodrome lies in a meadow, at sea level. The surface is good, but the surrounding country is unsuitable for forced landings. Dimensions for landing, 765 by 765 yards.

Obstructions.—Trees and telegraph wires to the east, sheds in south-east corner.

Markings.—Large circle in centre of ground. Wind indicator in south-east corner.

Accommodation, etc.—No accommodation available. Petrol, oil, water and facilities for repairs can be obtained from the Veere seaplane station (see below). Repairs can also be carried out in Flushing.

2. The under-mentioned seaplane station is similarly available for use by civil aircraft *in emergency only* :—

Veere. Naval Seaplane Station.—*Position.*—Latitude 51° 33′ N., Longitude 3° 40′ E. Situated on the north-east coast of Walcheren Island, at the north end of the Walcheren canal, to the immediate north-east of the town of Veere and 4 miles north-east of Middleburg.

Description.—The surface of the water in front of the seaplane station is usually smooth, but becomes rough with north-west and south-east winds.

Obstructions.—*East*—Sand-bank behind which rises a sea-dyke 16 ft. high ; *west and south-west*—the town of Veere with two high towers ; *south-east*—sand-banks.

The shipping in the channel also forms an obstruction.

Markings.—A wind indicator (flag) is flown from one of the station hangars. There are coastal lights at the mouth of the Walcheren canal and obstruction lights on the hangars.

Accommodation, etc.—Hangars, slipway, petrol, oil and good facilities for repairs are available.

3. *Charges.*—No charges are made for civil aircraft using the foregoing stations for *bona fide* emergency landings.

4. *Authority.*—Dutch Ministry of Waterstaat.

5. *Previous Notices affected.*—The last three lines of paragraph 2 (" *Other Aerodromes* ") of Notice to Airmen No. 126 of 1920 are cancelled.

(No. 90 of 1921.)

Germany : Bickendorf Aerodrome : Flying of Captive Balloons

1. *Bickendorf Aerodrome.*—The military aerodrome at Bickendorf has been made available for the use of Allied civil aircraft.

Position.—Rhine Province. Lat. 50° 57′ N., Long. 6° 54′ E. (approx.). Situated near Bickendorf village, about 6 kms. N.W. of Cologne, at a height of 160 ft. above sea level.

Description.—Level grass surface. The southern portion is in the best condition. Dimensions for landing, 440 by 440 yards.

Obstructions.—East side : Hangars. South side : Huts and trees.

Signals and Markings.—There is a landing Tee in the middle of the aerodrome and a conical canvas wind indicator in the S.E. corner.

Accommodation, etc.—This aerodrome is at present occupied by a squadron of the Royal Air Force, which will shortly be withdrawn. Until the withdrawal is effected, accommodation, supplies and repair facilities may be obtained at the discretion of the Commanding Officer, but it is improbable that accommodation, supplies or facilities will be available subsequently.

2. *Other Aerodromes.*—Pending the receipt of more definite information concerning other aerodromes in Germany, it is proposed to publish no details of these aerodromes in Notices to Airmen.

Pilots wishing to obtain information with regard to Germany or particular German aerodromes should apply to the Secretary (C. of I.), Air Ministry, London, W.C. 2.

3. *Flying of Kites or Captive Balloons.*—Kite or captive balloon ascents for meteorological purposes are carried out daily at the following places in Germany :—

Breslau (Krietern) Aeronautical Observatory.—Exact position doubtful.

Lindenberg (Beeskow) Aeronautical Observatory.—12 kms. N.E. of Berlin.

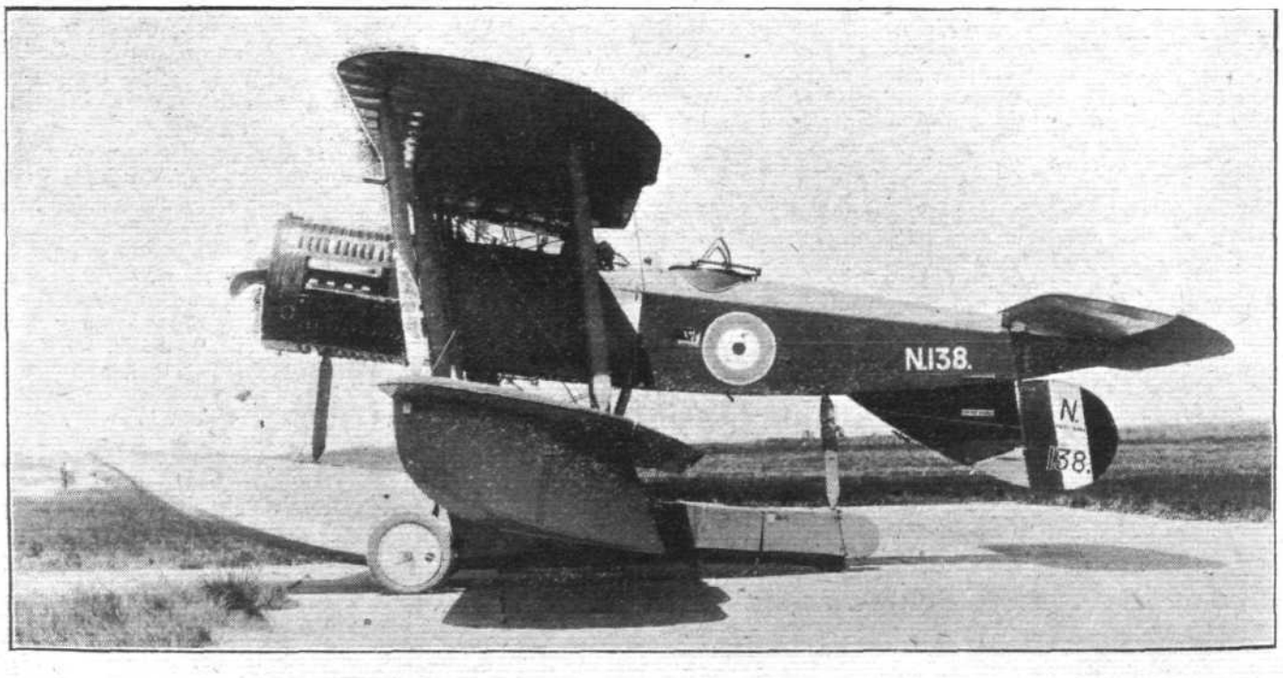
Friedrichshafen, Lake Constance.—Above the lake.

Kranz (Samland).—On the coast 28 kms. N. of Konigsberg.

Altenwalde.—7 kms. S.S.W. of Cuxhaven.

Pilots flying in the vicinity of these places should, therefore, keep a careful look-out, as the wire of the kite or balloon constitutes a danger to aircraft.

(No. 95 of 1921.)



THE PARNALL " PUFFIN " DECK-LANDING AMPHIBIAN : Side view. As this machine belongs to the Air Ministry no technical details may be given beyond those which can be gathered from the photographs. The machine, which has a 450 h.p. Napier " Lion " engine, is unusual in having a single main float.

FLIGHT

ROYAL AERONAUTICAL SOCIETY

Lecture.—The next meeting will take place at 5.30 p.m. on Thursday, November 3, when Sqdn.-Ldr. R. M. Hill, M.C., A.F.C., will read a paper on "The Manœuvres of Getting Off and Landing."

Election of Members.—The following members were elected at a meeting of the Council held on October 18.—*Students:* C. G. W. Ebbutt, W. S. Hollyhock, H. J. MacKintosh, N. S. Ferway, C. A. Pike, R. Radcliffe, C. Russell, S. O. Smith, C. A. Wright. *Associate Members:* Mrs. J. E. M. Pritchard, T. Tateno. *Foreign Member:* T. Tanaka.

Students' Discussion Meeting.—The first Students' Discussion Meeting was held in the Society's Library at 7 p.m. on October 13, with Mr. H. B. Irving, B.Sc., Associate Fellow, in the Chair, when Mr. T. A. Kirkup opened the proceedings with a paper on "A Comparison of Different Types of Aerofoils."

At the close of the meeting the following gentlemen were appointed a Provisional Committee to undertake the arrangements for the present session: Mr. W. H. Rossiter, Mr. L. J. Jones, with Mr. S. H. Evans as the Honorary Secretary.

The next Students' Discussion Meeting will take place in the Society's Library on Thursday evening, November 10, at 7 p.m., when a paper will be read by Mr. W. L. Le Page, on "The Soaring Flight Problem." Mr. F. Handley Page has kindly consented to take the Chair.

Airship Photographs.—A letter has been received from the Director of Research, Air Ministry, notifying the fact that it has been decided to present to the Society for placing in the Library for the information of Members ten books of airship photographs, collected as a record of various types of airships that were used during the War, "in acknowledgment of the Society's activities in the cause of aeronautics, more especially with regard to airships."

W. LOCKWOOD MARSH, Secretary

THE PARNALL "PUFFIN": Front view of the machine with wings folded. The large angle of the planes when folded is due to the pronounced stagger. Note the amphibian gear working in a slot in the main float.

"R.38" Memorial Research Fund

Second List of Donations received by the Royal Aeronautical Society.—W. H. Coats, Esq., £105; Messrs. Vickers, Ltd., £105; Flight-Lieut. A. H. Wann, £20; Sir Archibald Denny, Bart., £15 15*s.*; Sir H. McGowan, Bart., £10 10*s.*; Staff of Royal Airship Works, Cardington, £10 10*s.*; G. Holt-Thomas, Esq., £10 10*s.*; Lord Foley, £10; Lieut.-Col. John Dunville, £10; H. E. Yarrow, Esq., £10; J. E. Hodgson, Esq., £5 5*s.*; R. P. Wilson, Esq., £5 5*s.*; Council of Royal Aeronautical Society (second donation), £5; Lord Montagu of Beaulieu, Maj. C. C. Turner, Maj.-Gen. Sir Sefton Brancker, £3 3*s.* each; Maj. B. F. S. Baden-Powell, £1 1*s.*; John Newton, Esq., £1 1*s.*; S. E. Taylor, Esq., £1; Capt. A. E. Heatley, 10*s.*; total, £335 16*s.* Total with previous list published, £851 3*s.*

* * * *

Sir James Stevenson Resigns

Sir James Stevenson, Bart., has resigned his seat on the Air Council, owing to the increasing demand on his time of his duties as commercial adviser to the Secretary of State for the Colonies.

Sir James Stevenson has been a member of the Air Council for nearly three years. During the War he was a member of the Munitions Council. After the Armistice, when Mr. Churchill became Secretary of State for War and Air, Sir James Stevenson became a member of the Army Council as Surveyor-General of Supply and also an additional member of the Air Council. In this latter capacity he rendered great service in helping to organise the Air Ministry on a peace basis.

When Mr. Churchill went to the Colonial Office Sir James Stevenson gave up his post on the Army Council to accompany him, but at the particular request of Capt. Guest, the new Secretary of State for Air, he continued to give his voluntary services to the Air Council until the arrangements for civil aviation subsidies had been completed.

THE PARNALL "PUFFIN": Front view.

BOOK REVIEWS

Advisory Committee Reports

IT is probably true to say that before the War the publication of no book was looked forward to with greater impatience than the annual Technical Report of the Advisory Committee for Aeronautics. The technical reports were then, as now, the main source of information on aerodynamical problems, and if any criticism was offered it was on the score of publication rather than of the matter contained in the report. During the War it became necessary to distribute the information contained in the reports much more rapidly, and the various reports were therefore published separately, under the general title "Reports and Memoranda." While this procedure was undoubtedly a great advantage from the point of view of rapidity of publication, it led to the accumulation of a number of very small and easily mislaid or lost books. Moreover, the issue of R. and M. was confined, during the war, to manufacturers and Government officials. With the cessation of hostilities, the publication, in the usual sense of the word, of the reports became permissible, and we have from time to time published in FLIGHT lists of the R. and M. as they became available. It thus became possible for anyone interested to purchase such of these reports as dealt with matters in which he was interested. There must, however, be many who would prefer to revert to the pre-war method of purchasing the reports complete in book form, and to them it will therefore be welcome news to learn that the R. and M. have now been published. We have before us the Reports for 1917-18, Vols. I and III. Vol. II has not yet, we understand, been released, but it is to be hoped that it will be so shortly.

In the publication of the Report for 1917-18 a somewhat different method has been followed from that obtaining before the war, inasmuch as the various reports have been grouped, as far as possible, according to subject. Thus Vol. I deals with model work, Vol. III with strength of construction, etc. The general character of the Advisory Committee Reports is already so well known and appreciated by readers of FLIGHT that it is quite superfluous for us to accompany the review with a recommendation to purchase. The reports are the accepted authoritative exposition of the science of aeronautics as it exists at the time of making the reports, and no one who is interested in, or whose work deals with, aviation in any of its branches can afford to be without the Advisory Committee Reports.

We have already mentioned that the reports to which we refer are the R. and M. collected and published in book form. The following are the contents of Vol. I. The figure preceding the title of each technical appendix is the R. and M. number.

497, On the suggested analogy between the conduction of heat and momentum during the turbulent motion of a fluid, by Lord Rayleigh, with an appendix by Dr. T. E. Stanton. 332, ortex motion. Preliminary report upon an experimental method of investigating, by the aid of kinematograph photography, the history of eddying flow past a model immersed in water, by J. L. Nayler and R. A. Frazer. 345, Observations and speculations on the nature of turbulent motion, by Maj. G. I. Taylor, R.F.C., presented by Sir Napier Shaw. 522, Experiments on models of a "Duplex" wind channel—(i) Note on a possible method of increasing the size of wind channels beyond their present limits, by Dr. T. E. Stanton and J. H. Hyde: (ii) Experiments on a model of the proposed 14 ft. by 7 ft. wind channel, with an investigation into the steadiness of the velocity and direction of the air flow compared with the corresponding effects in an existing 7-ft. channel, by J. H. Hyde. 418, Note on the form and resistance of the spindle used by the N.P.L. for standard tests of 18 in. by 3 in. aerofoils, by H. B. Irving and Miss C. N. Jones. 563, Description of apparatus for measurement in a wind tunnel of the performance of an airscrew or the windage torque of a rotary engine, by A. Fage, H. E. Collins and T. H. Fewster. 361, Experiments on a model of the German rigid airship "L.33," by J. R. Pannell and R. Jones. 311, The resistance of certain streamline-shaped bodies, by J. R. Pannell and N. R. Campbell. 338, A study of the flow of air in the neighbourhood of an airship shed and screens, and the forces and moments brought into play, by R. Jones and H. Levy. 423, The variation in the wind above an airship shed due to the presence of the shed, by F. G. Woodford and G. N. Pell. 428, Experiments on the most efficient form and distribution of windscreens for Bessoneau hangars, by J. L. Nayler and F. G. Woodford. 424, Ring screens for aeroplanes, by F. G. Woodford and G. N. Pell. 431, The airflow behind a screen for protecting an aeroplane in the open, presented by the Superintendent, Royal Aircraft Factory. 376, Model tests on bodies proposed for use as kite balloons, by L. F. G. Simmons and R. A. Frazer. 415, Tests on aerofoils R.A.F. 18, 19, 20, and a Sopwith section, by J. L. Nayler and F. G. Woodford. 377, Tests on two aerofoils for the British and Colonial Aeroplane Co., Ltd., by C. H. Powell. 375, Standard tests of two aerofoils of Portholme and Albatros sections, and a comparison of these with R.A.F. 15 section, by H. B. Irving and Miss C. N. Jones. 449, Tests on a highly-cambered aerofoil, by W. L. Cowley and H. Levy. 439, Experiments with two aerofoils of high aspect ratio, by A. Fage and J. D. Coales. 338, Forces and moments on R.A.F. 14 for negative angles of attack, by W. L. Cowley and H. Levy. 417, The effect of grooves down the face of an aerofoil, by C. H. Powell. 330, The effect of rounding the wing tips of an aerofoil having a high value of maximum lift coefficient, by H. B. Irving and C. H. Powell. 394, Forces and moments on a wing caused by cross-winds, by C. H. Powell. 366, Biplane effect on R.A.F. 15 section, by L. W. Bryant and Miss C. N. Jones. 419, On the effect of cutting a hole in the top plane of a biplane, by C. H. Powell. 432, Triplane investigation with R.A.F. 15 section, by W. L. Cowley and H. Levy. 355, The distribution of pressure on the upper and lower wings of a biplane, by H. B. Irving, C. H. Powell and Miss C. N. Jones. 347, Pressure distribution on model F.E. 9 wings, presented by the Superintendent of the Royal Aircraft Factory. 440, Forces, moments and interferences on wings and body of a 1/12 scale model of B.E.2E with R.A.F. 15 wing section, by C. G. D. Sandison and S. B. Gates. 515, Tests on a complete model of R.E. 8, by E. F. Relf and T. Lavender. 434, Tests on a model of the Grahame-White bombing machine G.W.E. 4, by E. F. Relf. 348, Measurements of the drag of the bodies of a model fighter and bomber machine, by A. Fage and H. E. Collins. 414, Air resistance of a model aeroplane *fuselage*, by C. H. Powell. 391, Model experiments on the fin effects of balanced and unbalanced rudders when hinged freely, presented by the Superintendent of the Royal Aircraft Factory. 381, An investigation to determine the best shape of fairing for a circular cylinder, by L. F. G. Simmons and R. A. Frazer. 433, Tests on struts suitable for the fairing of duplicate cables, by R. A. Frazer and L. F. G. Simmons. 416, The resistance of struts, by C. H. Powell. 378, Tests on the drag of a model bomb rack fitted to R.E. 8 machine, by E. F. Relf and R. Jones.

As already mentioned Vol. II for the year 1917-18 has not yet been published. It will contain mainly reports dealing with airscrews and with full scale work on aeroplanes.

Vol. III deals with seaplanes, fabrics and instruments (strength of construction, etc.), and contains the following Reports and Memoranda 364 and 373, Parts I and II, Critical loading of struts and structures, by W. L. Cowley and H. Levy. 380, Critical loading of similar structures, by W. L. Cowley and H. Levy. 405, The stresses in a loaded rigid structure with special reference to redundancies, by W. L. Cowley and H. Levy. 350, Report on the strength of the wings of captured German aeroplanes, by H. B. Irving. 443, Strength test of main plane ribs, method employed at the R.A.E. 403, The lateral buckling of wing spars, by J. Case and A. A. Griffith. 363, Short wooden struts, by W. H. Barling and H. A. Webb. 343, Tapered struts, by W. H. Barling and H. A. Webb. 386, The vibration of spars, by Lieut. A. H. Stuart, R.N.V.R., communicated by the Director of Air Services. 368, On the torsion of a *fuselage*, by H. M. Garner and Arthur Berry. 334, The determination of the torsional stiffness and strength of cylindrical bars of any shape; by A. A. Griffith; presented by the Superintendent R.A.E. 333, The use of soap films in solving torsion problems, by G. I. Taylor and A. A. Griffith. 392, The application of soap films to the determination of the torsion and flexure of hollow shafts, by A. A. Griffith and G. I. Taylor. 399, The problem of flexure and its solution by the soap-film method, by A. A. Griffith and G. I. Taylor; presented by the Superintendent of the R.A.E. 395, Report on tests made on various Australian timbers to determine their suitability for use in the construction of aeroplanes, by G. A. Hankins (N.P.L.). 510, The influence of time on the breaking load and elasticity of spruce members of aeroplanes, by W. H. Barling and J. D. H. Pritchard: presented by the Superintendent of the R.A.E. 528, A preliminary investigation of certain elastic properties of wood, by A. A. Griffith and C. Wigley. 412, Experiments with models of seaplane floats (12th series), by G. S. Baker and E. M. Keary. 410, Experiments with models of seaplane floats (13th series), by G. S. Baker and E. M. Keary. 437, Some notes on floats for

seaplanes of the single-float type (14th series), by G. S. Baker. 365, Experiments with models of seaplane floats (11th series), Part III. The wave formation produced by a seaplane of the single-float type. 396, Report on the action of sunlight on aeroplane fabric: its nature and prevention, by F. W. Aston; presented by the Superintendent of the R.A.E. 346, Report on the suitability of cotton fabrics for covering aeroplane wings, by A. J. Turner; presented by the Superintendent of the R.A.E. 446, Report on the comparative weathering qualities of British and German doped fabrics: presented by the Director-General of Aircraft Production. 359, Memorandum on the use of aluminium alloy sheet in place of fabric for aeroplane wings, etc., by F. W. Lanchester. 514, Report on protective varnishes for use on aeroplanes in hot climates. Part II, Experiments in sunlight, by J. E. Ramsbottom and A. V. Newton. 539, Note on a possible economy of solvent in doping aeroplane wings, by Guy Barr and Edith G. Wilson. 516, Some further notes on the hydrogen permeameter, by Dr. G. A. Shakespear. 435, Further applications of the katharometer, by Dr. G. A. Shakespear, with an investigation of some sources of error in the testing of fabrics, by H. A. Daynes. 513, Preliminary report on the variation of the hydrogen permeability of rubber membranes, with alteration in temperature; communication from the North British Rubber Co., Ltd., of an investigation carried out in their research department, by B. D. Porritt and W. S. Allen. 367, On the diffusion of hydrogen along the textile of balloon fabrics, with special reference to the effect of lateral leakage at seams, by G. A. Shakespear and H. A. Daynes. 517, Some notes on balloon seams, by Dr. G. A. Shakespear. 518, Results of some experiments on the permeability of clear Delta dope, by Dr. G. A. Shakespear. 501, Records of temperature and altitude, by Flight-Com· B. C. Clayton, R.N., with comments by Sir Napier Shaw. 436, Variation of temperature and humidity with altitude: notes on the wind and other meteorological observations made at Aboukir, received from Maj. W. R. G. Atkins, O. i/c Experiments, X.A.D., Egypt. 499, A report on high angle practice to determine the wind at various heights for comparison with simultaneous determinations by pilot balloon ascents: presented by Sir Napier Shaw. 531, Variation of wind speed near the ground: communicated by the Director, Naval Meteorological Service, Hydrographic Department, Admiralty. 351, The variation of static pressure in a natural wind, as the velocity changes, by J. R. Pannell.

507, Thunderstorms in the British Islands during January, February and March, 1917: report by Capt. C. J. P. Cave, presented by Sir Napier Shaw. 521, (i) Effect of wind on the time of flight from one place to another and back again, by Horace Darwin and C. C. Mason; (ii) Flying as affected by the wind, by F. W. Lanchester: abstracted from *Flying*; (iii) Flying as affected by the wind: communicated by Sir George Greenhill. 389, Economic flight of an aeroplane in a wind, by W. L. Cowley and H. Levy. 527, (i) On the steady flight of an aeroplane, when the gradual loss of weight owing to the consumption of petrol is taken into account, with special reference to the minimum consumption of petrol, by Arthur Berry. 534, High altitude flying, by F. W. Lanchester. 358, Flight by flapping wings, by A. Mallock. 490, Tests on an Empson suction tube and wind gauge, by C. H. Powell.

The price of each volume, obtainable from H.M. Stationery Office, Imperial House, Kingsway, is 21s. net.

LONDON TERMINAL AERODROME

Monday Evening, October 31.

THE chief interest at the air-station this week has been the existence of many rumours, the majority of them extraordinarily wild, as to the formation of new air lines.

There is little doubt but that the actual personnel of the company now known as the Continental Air Lines—but which is shortly to change its name—will come as a surprise to many. Some of the best-known men on the aerodrome are to hold responsible positions, and, if knowledge of airway working counts for anything, the new line is assured of success. They intend to open early in the spring with a service between London and Brussels: but it is by no means their intention to stop at this. Brussels has been chosen because of the possibilities it offers for expansion further into Europe, and it is intended to open an extension to Cologne, and to develop, in fact, a real trans-Continental air service.

Col. F. Searle, who was managing director of Aircraft Transport and Travel in its later days, and who is at the head of the new air service to be run by the Daimler Hire Company, visited the air-station, in company with his aerodrome manager Mr. Woods Humphreys, on Saturday morning. He was keenly interested in all the improvements made since the beginning of this year's "boom," and had long talks with Mr. Saul as to compasses, and with Mr. Hall on the matter of engines.

"Air Expresses" to do 1,000 Miles a Day

I AM given to understand that Col. Searle intends that the machines employed on his new service to Paris shall do 1,000 miles daily; at any rate, that is the general idea he is working on. Whether machines are far enough advanced, in robustness of design, to stand up to this, remains, of course, to be seen. It is Col. Searle's intention to run four services a day to Paris.

The K.L.M. have lost their newspaper contract as from today. There appears no tangible reason for this action on the part of the newspapers. They are quite satisfied with the service, and, as far as can be made out, their action is the result of a pre-determined policy to cease sending by air when the winter months arrive—evidently because of the old-fashioned idea that air services cannot be run in the winter. This makes a difference of roughly 200 pounds weight a day in the load of the K.L.M. monoplanes, and is, of course, a serious item. Every effort is being made to get the newspapers to alter their decision.

Mr. Shaw, of Shell-Mex, Aircraft Disposal Company, and Marconis, has been performing regularly on the wireless experimental "D.H.6," and has, in addition, been testing various machines for the Disposal Company. One of these is by way of being an innovation. A "D.H.9a" *fuselage* has been altered to take a Rolls-Royce engine, and Mr. Shaw was quite pleased with its performance. The machine is, I understand, to the order of the Spanish Government.

By Air to the Winter Sports

ON Thursday the Grands Express inaugurated their new service of "Goliaths" between Paris and Lausanne. The Director of Civil Aviation for France, and 10 other passengers, travelled in the first machine from Paris, which arrived at Lausanne at 12.30 p.m. It is now possible to book through tickets from London to Lausanne by air at the offices of the Grands Express at 81, Kingsway.

On Saturday there was another air raid on Paris, but this time it was of a peaceable nature. Two students of "Bart.'s" Hospital invaded the offices of Lepaerial, in Piccadilly Circus, and demanded free return seats to Paris. Through the courtesy of the Instone Air Line these were quickly obtained, and the students, in full operating theatre uniform, and plentifully besprinkled with the well-known Lepaerial yellow baggage label, "By Air," left on the "City of London" at 12.15 p.m. They raided the cafés and hotels of Paris, armed with collecting boxes, in an endeavour to add to the subscriptions received for the "Fleet Street Week for Barts."

On Wednesday traffic on the airways was disorganised completely by a thick fog, which stretched from London to Paris and across the North Sea to Rotterdam. No machines left either London or Paris, but one of the K.L.M. monoplanes left Amsterdam at 11.10 a.m. The pilot was, however, forced to wait at Rotterdam until 1.37 p.m. before setting out on his journey to Croydon. Then, after flying round for some time, the pilot, Mr. Hofstra, was forced to give it up and return to Rotterdam.

Importance of Amsterdam Air-Station

IT is interesting to note that Amsterdam has become the third largest air-station from a traffic point of view. During the period between April 14 and October 3, no fewer than 1,000 machines passed in and out of the station, and carried—in addition to large quantities of goods and mail—1,511 passengers.

Tests on a new wireless apparatus which has been erected in the control-tower were carried out on Saturday with extremely satisfactory results. This apparatus is for guiding aeroplanes once they have approached the air-station on days when visibility is bad, and it is difficult to pick out landmarks. The aerodrome and the surrounding district have been divided into sections, and the pilot is told which section he is over and is also advised when to turn. When the tests were made on Saturday with the Handley Page, the operator in the control tower guided the machine to various parts of the aerodrome.

THE ROYAL AIR FORCE

London Gazette, October 25

Maj. and Bt. Lieut.-Col. L. F. Blandy, D.S.O., R.E., to be Controller of Communications, Air Ministry; May 1, 1919.

Permanent Commissions

Sqdn.-Ldr. J. Stanley-Adams, D.S.C., resigns his commn., and is granted the rank of Lieut.-Col.; Sept. 19. Group Capt. C. S. Burnett, C.B.E., D.S.O., is restored to the active list from half-pay; Oct. 24. Flight-Lieut. H. V. Jerrard is placed on half-pay, Scale A, with effect from July 26, until further notice (substituted for *Gazette* Aug. 5).

Short Service Commissions

The following are granted short service commns. as Flying Offrs., with effect from, and with seny. of, the dates indicated :—R. S. Higgens; Oct. 15. A. H. Love; Oct. 11. G. H. Vasse; Oct. 17. Flight-Lieut. C. C. Treatt resigns his commn. and is granted the rank of Maj.; April 22 (substituted for the *Gazette* April 8). Flying Offr. C. N. C. Dickson, A.F.C., resigns his commn., and is permitted to retain the rank of Lieut.; Oct. 26. *Gazette*, Sept. 12, 1919 appointing Pilot-Offr. J. W. Bell, D.S.M., to a short service commn., is cancelled.

Stores Branch

Pilot-Offr., on probn., E. Clancy resigns his commn.; Oct. 6.

Seconding

Lieut. M. R. Cooper, Devon R., is granted a temp. commn. as a Flying Offr. on seconding, for four years' duty with the R.A.F.; Oct. 15.

Flying Branch

Pilot-Offr. J. W. Bell, D.S.M., to be Flying Offr.; March 7, 1920.

Technical Branch

Col. L. F. Blandy, D.S.O. (Maj. and Bt. Lieut.-Col., R.F.), relinquishes his temp. R.A.F. commn.; May 1, 1919). Flying Offr. R. W. R. Rankin relinquishes his temp. commn. on ceasing to be empld.; Oct. 26.

Medical Branch

Flight-Lieut. A. Parker relinquishes his temp. commn. on ceasing to be empld., and is permitted to retain the rank of Capt.; Oct. 6. Flight-Lieut. (Hon. Sqdn. Ldr.) J. Keenan relinquishes his temp. commn. on ceasing to be empld., and is granted the rank of Maj.; Oct. 7.

Dental Branch

The following offrs. are transfd. to the Army Dental Corps (and will receive all emoluments from Army funds), with effect from the dates indicated. They will continue to hold their temp. R.A.F. commns. while attd. to the R.A.F. :—

Flight-Lieuts.—Actg. Sqdn. Ldr. C. L. Colbran, D. Blair; April 1.

Flight-Lieuts.—L. S. Woodiwis, D. H. W. Williamson, G. F. Charles, A. Williams, J. H. W. Fitzgerald; July 1.

Flight-Lieut.—J. Wren; Aug. 1.

Gazette, June 28, regarding Flight-Lieut. (Actg.-Sqdn.-Ldr.) C. L. Colbran and Flight-Lieut. D. Blair is cancelled. Lieut. (tem. Capt.) N. H. Medhurst (Army Dental Corps) is granted a temp. commn. as a Flight-Lieut. in the R.A.F. while attached for R.A.F. duty; June 27.

Stores Branch

The temp. commn. of Flying Offr. H. J. Cooper is terminated on cessation of duty; Oct. 10.

Memorandum

One Cadet is granted an hon. commn. as Sec. Lieut.; Feb. 9, 1919.

Erratum

Gazette, Oct. 14, page 8,104 :—For J. P. Walters, M.B.E., read J. P. Walters.

London Gazette, October 28

Flying Branch

Sec. Lieut. L. W. Sage is transferred to the unemployed list; April 12, 1919 (substituted for *Gazette* April 18, 1919. Observer Offr. R. E. W. Sandall (Lieut. Lincs R.) relinquishes his temp. commn. on resigning his commn. in the Regular Army, and is permitted to retain the rank of Lieut.; Oct. 29.

Memoranda

Hon. Sec. Lieut. F. L. Braithwaite relinquishes his hon. commn. July 24, 1919. Hon. Sec. Lieut. P. Robertson relinquishes his hon. commn. on joining the Army; Dec. 9, 1919. Capt. (actg. Maj.) the Hon. J. H. B. Rodney, M.C., is transferred to the unemployed list; March 11, 1919 (substitute for *Gazette*, April 4, 1919).

Three Cadets are granted hon. commns. as Sec. Lieuts., with effect from the dates of their demobilisation

ROYAL AIR FORCE INTELLIGENCE

Forthcoming Appointments.—It is notified for information that the following appointments in the Royal Air Force will take place early in 1922 :—

To the Command of the Royal Air Force in Egypt.—Air Vice-Marshal Sir E. L. Ellington, K.C.B., C.M.G., C.B.E. *vice* Air Vice-Marshal Sir Geoffrey Salmond, K.C.M.G., C.B., D.S.O.

To be Director-General of Supply and Research.—Air Vice-Marshal Sir Geoffrey Salmond, K.C.M.G., C.B., D.S.O., *vice* Air Vice-Marshal Sir E. L. Ellington, K.C.B., C.M.G., C.B.E.

Appointments.—The following appointments in the Royal Air Force are notified :—

Squadron-Leaders B. L. Huskisson, D.S.C., from No. 84 Squadron (Middle East Area) to Iraq Group Headquarters (Middle East Area). (Supernumerary.) 1.10.21. W. Sowrey, A.F.C., from No. 30 Squadron (Middle East Area) to command No. 84 Squadron (Middle East Area). 1.10.21.

Flight-Lieutenants I. L. Wincer, from No. 4 Stores Depôt to No. 2 Flying Training School (Inland Area). 25.10.21. A. G. N. Belfield, from No. 4 Stores Depôt to Electric and Wireless School (Inland Area). 26.10.21. C. E. Wardle, from Record Office (Inland Area) to R.A.F. Depôt (Inland Area), (Supernumerary). 28.10.21. R. G. Home, from No. 1 Group Headquarters (Inland Area) to Marine and Armament Experimental Establishment (Coastal Area). 8.11.21. W. B. Everton, from R.A.F. (Cadet) College (Flying Wing), (Cranwell) to R.A.F. Depôt (Inland Area). (Supernumerary). 18.10.21. B. C. Meates, from Headquarters(Coastal Area) to R.A.F. (Cadet) College (Flying Wing), (Cranwell). 27.10.21. E. F. Turner, A.F.C., from No. 1 Flying Training School (Inland Area) to School of Technical Training (Men), (Inland Area). (Supernumerary). 1.11.21. G. C. Parie, M.C., from Inspector of Recruiting (Coastal Area) to R.A.F. Depôt (Inland Area). (Supernumerary). 12.10.21.

IN PARLIAMENT

Enemy Air Raids (Compensation Claims)

MR. BOWERMAN, on October 25, asked the Financial Secretary to the Treasury if he is aware that claims for compensation for loss of homes destroyed by enemy air-raids in London in September, 1915, still remain unsettled; that the sufferers have made repeated application to the Reparation Claims Department, but without satisfactory result; and if he can state when these compensation claims are likely to be settled?

Mr. Young: All claims in respect of air-raid damage which have not already been satisfied will be submitted by the Reparation Claims Department to the Royal Commission on Compensation for Suffering and Damage by Enemy Action, which was appointed on the 15th August last. The Royal Commission will recommend the distribution in grants to individuals of the first sum of £5,000,000 received by this country from Germany on account of reparation. The amounts hitherto received from Germany are insufficient to satisfy the prior claim for cost of occupation, and accordingly nothing has yet been received on account of reparation. I am unable to state when the sum of £5,000,000 on account of reparation will be received.

Mr. Bowerman: Is the hon. gentleman aware that in the neighbourhood of Deptford working-class homes were destroyed and lives were lost, that though those concerned have waited for six years, they have had no compensation; and could not the matter be expedited?

Mr. Young: I think the terms of the answer I have just read out give the decision of the Government on the question of the principle involved in this matter. I could not at the moment make any departure.

Airships

SIR W. JOYNSON-HICKS asked the Secretary of State for Air whether he can make any statement as to the negotiations with the Dominions in reference to the continuance of airships; and what is the present position of the material and staff connected with lighter-than-air craft?

Capt. Guest: I am, at present, unable to make any statement as to the negotiations with the Dominions on this matter, as no official notification has yet been received. As regards the second part of the question, the whole of the airships, material and stores likely to be of use in the event of airship operations being continued, is being stored at Cardington and Pulham. The personnel at these stations is being reduced until no more is left than will suffice for care and maintenance parties. The Royal Air Force airship personnel not required for storing the airships and airship material, or for the care and maintenance parties at Pulham and Cardington, are being absorbed in the general service of the Royal Air Force.

Sir W. Joynson-Hicks: Are any of them being turned out of the service?

Capt. Guest: They are being absorbed.

Airship "R. 38" (Design)

REAR-ADMIRAL SUETER, on October 26, asked the Parliamentary Secretary to the Admiralty who was responsible for the design of rigid airship "R. 38"; and what was the procedure in regard to checking the design of this airship?

The Secretary of State for Air: I have been asked to reply to this question. The airship was designed in September, 1918, by the airship design staff, which was transferred from the Admiralty to the Air Ministry on October 22, 1919, by which date the construction of the airship had been begun. The procedure adopted for passing and checking the design, upon which any question as to responsibility would hinge, is still under investigation by the Aeronautical Research Committee.

Mr. Raper: Will the right hon. gentleman publish as a White Paper the full reports of the enquiries which have been held and which will be held as to the cause of the disaster?

Capt. Guest: I am not sure it has not already been done; if it has not been done, it is in process of being done.

Aerodynamical Department, National Physical Laboratory

LIEUT.-COL. MOORE-BRABAZON asked the Secretary of State for Air whether it is proposed to close the aeronautics department of the National Physical Laboratory; and whether this action is on the advice of the Aeronautical Research Committee?

Capt. Guest: The decision not to maintain after the conclusion of the current financial year the Aerodynamical Department of the National Physical Laboratory, arrived at solely in view of the urgent need to effect every possible economy, was not taken on the advice of the Aeronautical Research Committee. Strong representations have been made that this Department should be retained in the interests of aeronautics, and I am hoping still to preserve its most vital functions, if a sufficient reduction in the cost of its upkeep can be effected.

Director of Research

LIEUT.-COL. MOORE-BRABAZON asked whether the Director of Research at the Air Ministry has had any experience at all of research work in any direction?

Capt. Guest: As my hon. and gallant friend is aware, the officer in question —Air Commodore H. R. M. Brooke-Popham, C.B., C.M.G., D.S.O., A.F.C.— has had practical experience of flight and its problems from a very early date. He has also had a wide and varied experience of research work in connection with aeronautics during the two years and nine months for which he has held his post.

Helicopter

LIEUT.-COL. MOORE-BRABAZON asked whether the Aeronautical Research Committee have ever been consulted as to the expenditure of money upon the building of a helicopter; and, if so, was their opinion favourable towards such construction?

Capt. Guest: The answer to the first part of the question is in the negative, and the second part does not, therefore, arise.

Airship "R. 38"

REAR-ADMIRAL SUETER asked whether in the preliminary trials of "R. 38" any girders buckled; was any additional stiffening worked into the duralumin framework of the hull; if so, is it known whether the fracture to the girders that caused the lamentable accident to this airship took place in the vicinity of this additional stiffening; and in the report on the preliminary trials was the design criticised in any way by a competent air officer?

Capt. Guest: It is true that in one of the preliminary trials of "R. 38" a girder buckled, and that this part was subsequently strengthened. It is not, however, the case that the failure of this part had any connection with the accident to the vessel. The girder in question bore little relation to the strength of the ship, but was merely one of those which was used to preserve the rounded surface of the outer envelope. The answer to the last part of the question is in the negative.

Rear-Admiral Sueter asked the Secretary of State for Air what was the total cost of "R. 38," and who bears this expenditure?

Capt. Guest: It would be difficult to ascertain the total actual expenditure on the airship, but the purchase price agreed with the United States authorities and based on the estimated cost was 2,000,000 dollars. The agreement provides that in the event of total loss of the airship prior to delivery the cost shall be shared equally by the two Governments, and steps are at present being taken to adjust the accounts on this basis.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN OCTOBER 23 AND OCTOBER 29, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying Mails	No. of flights carrying Goods	No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
						h. m.		
Croydon-Paris	25	67	9	23	25	2 17	H.P. G-EAPJ (2h. 2m.) ...	B. (1), D.H.18 (2), G. (3) H.P. (4), Sp. (5), V. (1).
Paris-Croydon	26	61	9	24	24	3 31	D.H.18 G-EAWO (2h. 34m.)	B. (2), D.H. 18 (2), G. (3), H.P. (5), Sp. (5), V. (1).
Croydon-Amsterdam ...	5	4	5	5	5	3 29	Fokker H-NABT (2h. 58m.)	F. (4).
Amsterdam-Croydon ...	5	3	5	3	4	4 7	Fokker H-NABT (3h. 33m.)	F. (4).
Totals for week ...	61	135	28	55	58			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

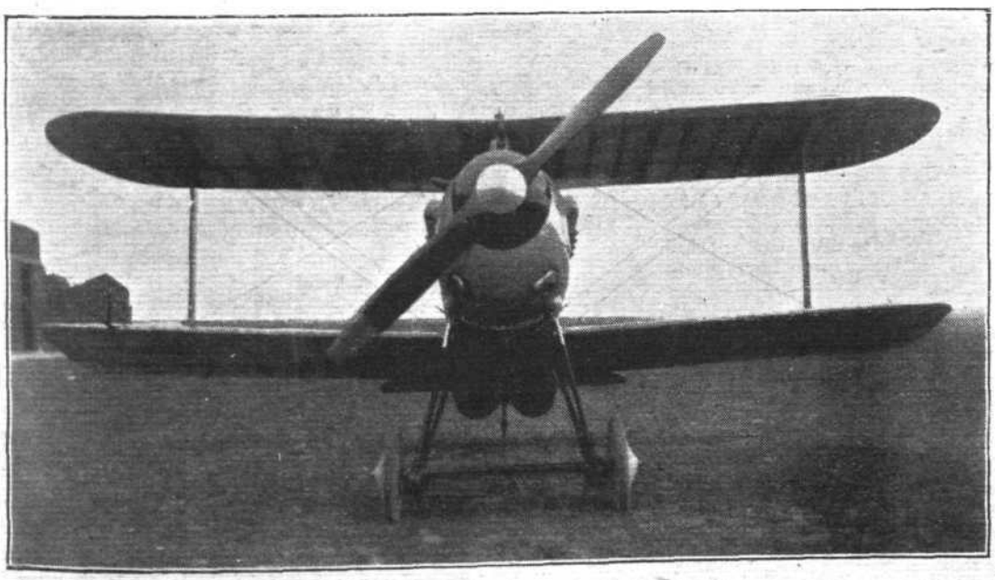
Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Saimson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries **Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.**

8,700 MILES BY FLYING BOAT

A REMARKABLE aerial demonstration tour was completed recently in America by the Aeromarine 11-passenger flying boat (F-5-L type), "Santa Maria." Starting from Key West—the most southerly point of the U.S.A.—the "Santa Maria" proceeded up the Atlantic Seaboard to Washington and New York City, calling at various places *en route*, where demonstration and passenger flights were made. From New York the boat flew up the Hudson River to Newburgh, from Newburgh to Albany—encountering unpleasant side winds from the Catskill Mountains on the way—thence to Lake George. The following day the "Santa Maria" proceeded to Plattsburg, *via* Lake Champlain and the Adirondacks, thence to Montreal, and from here over the St. Lawrence River and its Rapids, across Lake Ontario to Toronto. From Toronto the journey was continued, above the Niagara Falls, to Buffalo where a stop was made for the night. The next day the boat flew on to Detroit, and after a stay at this place proceeded along the shores of Lake Huron and Lake Michigan to Chicago, calling at several towns in between.

From Chicago the "Santa Maria" followed the Illinois and Mississippi Rivers to New Orleans, thence back to Key West, thus having completely circumnavigated the Eastern section of the United States. Although the total distance of this tour is about 6,000 miles as the crow flies, the "Santa Maria" made a large number of passenger flights at each of the cities she visited—about 2,000 passengers were taken up—and in this way actually covered over 8,700 miles. A representative of the U.S. Navy was carried throughout the tour, first in the person of Admiral C. J. Peoples, and then Commander Bellinger of N.C.1 fame. Capt. Tibbs acted as pilot.



The British Deutsch Cup Challenger: The Mars I, designed by Mr. H. P. Folland and built by the Gloucestershire Aircraft Co. of Cheltenham, was fitted while at Etampes with Lamblin radiators. The result was an increase in speed of several miles per hour, and but for the fabric stitching failing, this machine would undoubtedly have given an excellent account of itself in the race. Incidentally, what about adapting this type of machine for military purposes? With slightly larger wings, so as to improve the climb and reduce the landing speed, it should prove a formidable rival to existing types.

SIDE-WINDS

WE have received from LepAerial Travel Bureau, Criterion Corner, Piccadilly Circus, a handy little booklet containing time tables and all sorts of useful information relating to the various air lines running between London and the Continent, and between Paris and Warsaw, and Paris and Casablanca. The German air lines have not, however, been included. In addition to the times of departure and arrival of the various services, the booklet gives the fares, information relating to baggage, passport visés, etc. Altogether the publication should be of great assistance to anybody who contemplates a trip by air.

* * *

IF proof were needed of the popularity of the small handbooks issued by the British Aluminium Co., Ltd., of 109, Queen Victoria Street, E.C. 4, under the general title, "Hints on Working Aluminium," it is provided by the fact that this useful little series has now reached another edition. The series, which is uniform in size with Aluminium, "Facts and Figures," comprises ingots, sheet, circles, tubes and sections. Each booklet gives, within a small compass, a lot of useful information regarding the working of the aluminium in whatever form is being dealt with, and users of aluminium who do not already possess the series should write to the firm, when they will be supplied gratis.

* * *

MR. ALBERT W. CLAREMONT, of Vernon House, Bloomsbury, W.C., solicitor, who has been associated with Rolls-Royce, Ltd., from its commencement, has accepted the seat on the Board of Directors of that company which was recently vacated, owing to ill-health, by Mr. Ernest Claremont.

* * *

MR. H. ROYCE, who for over twenty years was associated with Wolseley Motors, Ltd. (Vickers, Ltd.), during the greater portion of which period he has been in charge of their purchases department, has joined Rolls-Royce, Ltd., as buyer at their Derby works.

* * *

AS recorded in FLIGHT recently, Capt. F. S. Barnwell, the well-known designer to the Bristol Aeroplane Co., Ltd., has accepted a technical appointment under the Government of Australia. As his successor Mr. W. T. Reid has been appointed to the position of chief designer to the Bristol Company. Mr. Reid has been Capt. Barnwell's right-hand for some years past, and has been responsible for a good deal of the important designing work which has issued from the Company's drawing office during that period, more especially in regard to the design of modern commercial aircraft. Mr. Reid has had a wide engineering experience, and, in addition to service with such well-known firms as Messrs. W. H. Allen and Son, Ltd., of Bedford, and the Fairfield Shipbuilding and Engineering Co., Ltd., of Glasgow, he spent a period in the Designing Department of the R.A.E. at Farnborough, before he was appointed to the staff of the Bristol Aeroplane Co., Ltd.

* * *

"WOLSELEY Gauges, Taps and Dies" is the title of an interesting brochure issued by Wolseley Motors, Ltd., of Adderley Park, Birmingham. During the war the necessity for accurately-machined nuts and bolts in large quantities led to a great demand for screw gauges to fine limits. The Wolseley Gauge Department, which had long been manufacturing these gauges in connection with the Wolseley car manufacture, was consequently largely extended and developed in connection with the Ministry of Munitions. Messrs. Wolseley Motors, Ltd., have now decided to offer these high-grade screw gauges, perfected by a patent process, for the use of engineers in general, and the booklet referred to deals, as its title implies, with these gauges, as well as with taps and dies, including hand, machine, tapper taps, and screwing dies. These, like the gauges, are produced by the special patented thread grinding process, so that errors of pitch and form are practically eliminated.

* * *

"THE Welding Test" is the title of an 84-page crown quarto publication written and illustrated by the staff of Barimar, Ltd., and issued by that firm at 10, Poland Street, W. 1. During the war Barimars made over 70,000 repairs in their London factories for the British Admiralty, War Office, Air Ministry, Food Production Departments, Military Transport and Aircraft Centres, the great shipbuilding and armament factories, etc. The knowledge gained in the hard school of experience has placed Barimars in the very front rank of scientific welding experts, and the book mentioned above deals with every imaginable class of engineering repair. Even nickel and chrome steels are not outside the scope of Barimar welding, and we notice that many remarkable repairs have been made to crankshafts of all sizes. The Engineers' Edition of "Scientific Welding," which is handsomely printed on thick art paper and is bound in an embossed board cover tied with silk cord, represents 16 years' experience in scientific welding, and we thoroughly recommend it to every engineer who is not thoroughly conversant with all the possibilities of and latest achievements in scientific welding. A charge of 10s. is made, and the book is obtainable from the address given above.

* * *

"DROP Forgings *plus Service*," a short treatise issued by Thomas Smith's Stamping Works, Ltd., of Ribble Road, Coventry, gives a brief explanation of the advantages of drop forgings over castings, especially when the making of drop forgings is accompanied by the special precautions which are so rigorously enforced at Smith's Stamping Works. From the time the metal enters the works, each billet is distinctively marked to show its nature and quality, until it is turned out as a finished drop forging, infinite care is taken to see that it is in every way up to specification. Skilled supervision, special testing machines, and the maintenance of a staff of metallurgical experts are the main features which constitute the *service*, but it would be impossible for us here to enter into the details. These are all contained in the little volume, a copy of which will be sent free to anyone interested in the manufacture and use of drop forgings in preference to castings for metal parts.

* * * *

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* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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